

- 1     What is claimed is:
- 2     1. A manufacturing process of memory module with directly die-attachment comprising
- 3     the following steps of:
- 4     providing a wafer, the wafer containing a plurality of memory chips;
- 5     dicing the wafer to form a plurality of individual memory chips;
- 6     providing a module substrate, the module substrate having a plurality of gold fingers for
- 7     outer connection;
- 8     mounting a predetermined amount of the memory chips on the module substrate and
- 9     electrically connected with the gold fingers of the module substrate;
- 10    performing a first module-level testing to test the memory chips on the module substrate;
- 11    and
- 12    packaging the memory chips on the module substrate.
- 13    2. The manufacturing process of memory module with direct die-attachment of claim 1,
- 14    wherein the gold fingers of the module substrate are contacted for module-level testing
- 15    the memory chips on the module substrate.
- 16    3. The manufacturing process of memory module with direct die-attachment of claim 1,
- 17    further comprising a step of: repairing the memory chips on the module substrate
- 18    according to the testing results of first module-level testing prior to the packaging step.
- 19    4. The manufacturing process of memory module with direct die-attachment of claim 3,
- 20    further comprising a step of: performing a second module-level testing to test the
- 21    memory chips attached on the module substrate after the repairing step.
- 22    5. The manufacturing process of memory module with direct die-attachment of claim 3,
- 23    wherein at least a bad memory chip is replaced with another memory chip during the
- 24    repairing step.
- 25    6. The manufacturing process of memory module with direct die-attachment of claim 5,
- 26    wherein the replacing memory chip is a known good die (KGD).
- 27    7. The manufacturing process of memory module with direct die-attachment of claim 3,

1 wherein at least a bad chip yet still repairable memory chip on module substrate is  
2 repaired by laser radiation during the repairing step.

3 8. The manufacturing process of memory module with direct die-attachment of claim 1,  
4 wherein an encapsulating material is formed to join the memory chips on the module  
5 substrate in the packaging step.

6 9. The manufacturing process of memory module with direct die-attachment of claim 8,  
7 wherein the encapsulating material seals the memory chips.

8 10. The manufacturing process of memory module with direct die-attachment of claim 1,  
9 wherein a metal shield is combined with the module substrate for protecting and  
10 thermally dissipating the memory chips in the packaging step.

11 11. The manufacturing process of memory module with direct die-attachment of claim 10,  
12 wherein the metal shield is attached to the memory chips on the module substrate.

13 12. The manufacturing process of memory module with direct die-attachment of claim 1,  
14 wherein the module substrate has a plurality of chip-mounting sockets for mounting the  
15 memory chips.

16 13. The manufacturing process of memory module with direct die-attachment,  
17 comprising the following steps:

18 providing a module substrate, the module substrate having a plurality of gold fingers at  
19 one side;

20 mounting a plurality of memory chips on the module substrate, each memory chip having  
21 a plurality of electrodes electrically connecting with the gold fingers of the module  
22 substrate;

23 performing a module-level testing to test the memory chips on the module substrate by  
24 contacting the gold fingers of the module substrate; and

25 packaging the memory chips on the module substrate after the module-level testing.

26 14. The manufacturing process of memory module with direct die-attachment of claim 13,  
27 further comprising a step of: repairing the memory chips on the module substrate

1        according to the testing results of the module-level testing.

2        15. The manufacturing process of memory module with direct die-attachment of claim 13,  
3        wherein the module substrate has a plurality of chip-mounting sockets for mounting the  
4        memory chips.

5        16. The manufacturing process of memory module with direct die-attachment of claim 13,  
6        wherein an encapsulating material is formed to join the memory chips in the packaging  
7        step.

8        17. The manufacturing process of memory module with direct die-attachment of claim 13,  
9        wherein a metal shield is combined with the module substrate for protecting and  
10       thermally dissipating the memory chips in the packaging step.

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